WHAT IS CLAIMED IS:

1. A sample observation method using a solid immersion lens having a spherical optical surface with a radius of curvature $R_L$ formed from a material having a refractive index $n_L$;

wherein the sample is observed with the solid immersion lens, while using as a sample observation surface a surface, substantially orthogonal to an optical axis, including a point located downstream of a spherical center of the optical surface by $k \times (R_L/n_L)$ along the optical axis, where $k$ $(0 < k < 1)$ is a coefficient set such that the solid immersion lens yields a geometric aberration characteristic satisfying a predetermined condition.

2. A sample observation method according to claim 1, wherein the solid immersion lens has a thickness of $d_L = R_L + k \times (R_L/n_L)$ along the optical axis; and

wherein the sample observation surface coincides with the sample-side lens surface of the solid immersion lens.

3. A sample observation method according to claim 1, wherein the solid immersion lens has a thickness of $d_L < R_L + k \times (R_L/n_L)$ along the optical axis, the sample observation surface being a virtual observation surface assuming that the sample has a

refractive index equal to the refractive index $n_L$ of the solid immersion lens; and

wherein the thickness of the solid immersion lens satisfies $d_L = L - t_S \times (n_L/n_S)$ with respect to the length $L = R_L + k \times (R_L/n_L)$ along the optical axis from a vertex to the virtual observation surface, where $n_S$ is the refractive index of the sample, and $t_S$ is the thickness of the sample to the actual observation surface.

4. A sample observation method according to claim 1, wherein the geometric aberration characteristic is evaluated with a virtual optical system using a back focal plane of the solid immersion lens as a pupil plane, and the coefficient k is set according to a result of the evaluation.

5. A sample observation method according to claim 1, wherein the geometric aberration characteristic caused by the solid immersion lens is evaluated by a sagittal image surface, a meridional image surface, or an average image surface of the sagittal image surface and meridional image surface, and the coefficient k is set according to a result of the evaluation.

6. A sample observation method according to claim 1, wherein the coefficient k is a value within the range of $0.5 < k < 0.7$.

7. A sample observation method according to claim 1, wherein the coefficient k is a value within the range of $0 < k \leq 0.5$.

8. A solid immersion lens having a spherical optical surface with a radius of curvature $R_L$ formed from a material having a refractive index $n_L$; wherein the distance along an optical axis from a vertex to a virtual observation surface assuming that a sample to be observed has a refractive index equal to the refractive index $n_L$ of the solid immersion lens is $L = R_L + k \times (R_L/n_L)$, where k $(0 < k < 1)$ is a coefficient set such that the solid immersion lens yields a geometric aberration characteristic satisfying a predetermined condition; and

wherein the solid immersion lens has a thickness satisfying $d_L = L - t_S \times (n_L/n_S)$ along the optical axis, where $n_S$ is the refractive index of the sample, and $t_S$ is the thickness of the sample to an actual observation surface.

9. A solid immersion lens according to claim 8, wherein the coefficient k is a value within the range of $0.5 < k < 0.7$.

10. A solid immersion lens according to claim 8, wherein the coefficient k is a value within the range of $0 < k \leq 0.5$.